CLAIM AMENDMENTS

What is claimed is:

1.   (Original) A method in a network element comprising:

converting Point to Point Protocol (PPP) protocol data units (PDUs) encapsulated according to different protocols into PPP PDUs within a uniform encapsulation; and

transmitting the uniformly encapsulated PPP PDUs.

2.   (Currently Amended) A method in a network element comprising:

using a Point to Point Protocol over Ethernet (PPPoE) session identifier to track a first flow of PPP protocol data units (PDUs) encapsulated with a non-Ethernet protocol;

converting each PDU of the first flow of PPP PDUs into PPPoE PDUs using the session identifier; and

converting each PDU of a second flow of PPPoE PDUs with the session identifier into a ~~second flow of~~ PPP PDUs encapsulated with the non-Ethernet protocol.

3.   (Currently Amended) A method in a network element comprising:

obtaining a Point to Point Protocol over Ethernet (PPPoE) session identifier for a first flow of PPP protocol data units (PDUs) that are encapsulated with a non-Ethernet protocol, wherein the first flow of PPP PDUs are received over a first port;

converting each PPP PDU of the first flow into a converted first flow of PPPoE PDUs based on the session identifier for the first flow;

~~tracking the converted first flow; and~~

transmitting the ~~flow of converted PPPoE PDUs~~ converted first flow of PPPoE PDUs via a second port; and

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converting each <u>PPP PDU</u> of a <u>second</u> flow of PPPoE PDUs received via the second port into a <u>converted</u> second flow of PPP PDUs ~~of~~ <u>encapsulated with</u> the non-Ethernet protocol, wherein the <u>second</u> flow of PPPoE PDUs received via the second port corresponds to the ~~obtained~~ PPPoE session identifier.

4.   (Previously Presented) A network element comprising:

a link layer port to receive link layer traffic encapsulated according to a link layer protocol;

a link layer demultiplexer to demultiplex link layer traffic received via the link layer port into Point to Point Protocol over Ethernet (PPPoE) traffic, PPP over non-Ethernet (PPPoX) traffic, and non-PPP traffic;

a virtual router coupled with the link layer demultiplexer, to forward non-PPP traffic received from the link layer demultiplexer;

a Point to Point Protocol (PPP) switch module having,

a PPPoX proxy module to convert PPPoX traffic received from the link layer demultiplexer into PPPoE traffic and to <u>re</u>convert PPPoE traffic received from a PPPoE multiplexer/demultiplexer into PPPoX traffic;

a PPPoE switch module to switch PPPoE traffic received from the link layer demultiplexer and from the PPPoE multiplexer/demultiplexer; and

the PPPoE multiplexer/demultiplexer coupled with the PPPoX proxy module and the PPPoE switch module, the PPPoE multiplexer/demultiplexer to multiplex PPPoE traffic received from the PPPoE switch module and the PPPoX proxy module and to demultiplex PPPoE traffic into different traffic flows according to their session identifier.

5.   (Currently Amended) A network comprising:

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a first network element

to receive a set of one or more flows of Point to Point Protocol over <u>Ethernet</u> <u>(PPPoE) and a set of one or more flows of Point to Point Protocol over</u> non-Ethernet (PPPoX) traffic via a first port,

to obtain a Point to Point Protocol over Ethernet (PPPoE) session identifier for each of the set of flows of PPPoX traffic,

to convert each of the set of flows of PPPoX traffic into ~~different~~ flows of PPPoE traffic in accordance with their session identifiers,

to multiplex the ~~different~~ flows of PPPoE traffic,

to transmit the multiplexed PPPoE traffic via a second port; and

a second network element coupled with the first network element, the second network element to receive the multiplexed PPPoE traffic and to <u>transmit the multiplexed</u> <u>PPPoE flows to a set of one or more aggregators</u> ~~terminate each of the different flows of~~ ~~PPPoE traffic~~.

6.   (Currently Amended) A network comprising:

a set of one or more service provider points of presence (PoPs) to receive traffic that Includes Point to Point Protocol over non-Ethernet<u>(PPPoX)</u> traffic on a set of one or more subscriber side flows and to tunnel the traffic through a network cloud;

a PoP Major of the service provider coupled with the network cloud, the PoP Major to receive the <u>PPPoX</u> traffic and to transmit the traffic as <u>Point to Point Protocol</u> over Ethernet <u>(PPPoE)</u> traffic along a single ~~relatively inexpensive~~ media<u>, wherein the set of one or more</u> <u>service provider PoPs are to convert each packet within the received traffic that is non-</u> <u>Ethernet traffic into PPPoE traffic by matching an entry in a data structure that provides a</u> <u>PPPoE session identifier for each packet to be converted</u>; and

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an aggregators coupled with the PoP Major, the aggregator to process the PPPoE

traffic.

7.   (Currently Amended) A ~~set of one or more~~ machine-~~readable~~ storage medium that

provides instructions, which when executed by a set of one or more processors, cause said

set of processors to perform operations in a network element comprising:

        converting Point to Point Protocol (PPP) protocol data units (PDUs) encapsulated

according to different protocols into PPP PDUs with a uniform encapsulation; and

        transmitting the uniformly encapsulated PPP PDUs.

8.   (Previously Presented) The method of claim 1, wherein the uniform encapsulation is

PPPoE encapsulation.

9.   (Previously Presented) The method of claim 1, wherein the converting is performed

by matching an entry in a data structure that provides a PPPoE session identifier for each

PPP PDU to be converted.

10.   (Previously Presented) The method of claim 9, wherein the data structure is not

created until a proxy module within the network element attempts to create an entry in the

data structure.

11.   (Previously Presented) The method of claim 9, wherein the data structure is modified

to indicate that a subscriber side flow is active once a PPP session is opened.

12.   (Currently Amended) The method of claim 1, further comprising:

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receiving PPP PDUs with the uniform encapsulation at ~~an~~ a set of one or more aggregator side port_s_; and

converting the PPP PDUs with the uniform encapsulation back into PPP PDUs encapsulated according to different protocols.

13.   (Previously Presented) The method as in claim 1, wherein the network element is agnostic of the encapsulation of the PPP PDUs to be converted.

14.   (Previously Presented) The method of claim 2, wherein the converting each PDU is performed by matching an entry in a data structure within the network element having a relationship between the session identifier and the first flow.

15.   (Previously Presented) The method of claim 14, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

16.   (Previously Presented) The method of claim 14, wherein the data structure is modified to indicate that the first flow is active once a PPP session is opened.

17.   (Previously Presented) The method as in claim 2, wherein the network element is agnostic of the encapsulation of the first flow and the converting each PDU is performed using the session identifier.

18.   (Previously Presented) The method of claim 3, wherein the converting each PDU is performed by matching an entry in a data structure within the network element having a relationship between the session identifier and the first flow.

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19.   (Previously Presented) The method of claim 18, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

20.   (Previously Presented) The method of claim 18, wherein the data structure is modified to indicate that the first flow is active once a PPP session is opened.

21.   (Previously Presented) The method as in claim 3, wherein the network element is agnostic of the encapsulation of the first flow.

22.   (Previously Presented) The network element of claim 4, wherein the PPPoX proxy module is to convert the PPPoX traffic by matching an entry in a data structure that provides a PPPoE session identifier for the PPPoX traffic to be converted.

23.   (Previously Presented) The network element of claim 22, wherein the data structure is not created until the PPPoX proxy module attempts to create an entry in the data structure.

24.   (Previously Presented) The network element of claim 22, wherein the data structure is modified to indicate that the PPPoX traffic is active once a PPP session is opened.

25.   (Previously Presented) The network element as in claim 4, wherein the network element is agnostic of the encapsulation of the PPPoX traffic received at the link layer port.

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26.   (Previously Presented) The network element of claim 5, wherein the first network element is to convert each of the set of flows of PPPoX traffic by matching an entry in a data structure that provides a PPPoE session identifier for each of the set of flows to be converted.

27.   (Previously Presented) The network element of claim 26, wherein the data structure is not created until the first network element attempts to create an entry in the data structure.

28.   (Previously Presented) The network element of claim 26, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

29.   (Previously Presented) The network element as in claim 5, wherein the first network element is agnostic of the encapsulation of the PPPoX traffic received by the first element.

30.   (Cancelled).

31.   (Previously Presented) The network of claim 30, wherein the data structure is not created until the set of one or more service provider PoPs attempt to create an entry in the data structure.

32.   (Previously Presented) The network of claim 30, wherein the data structure is modified to indicate that the set of one or more subscriber side flows is active once a PPP session is opened.

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33.   (Previously Presented) The network as in claim 6, wherein the set of one or more service provider PoPs is agnostic of the encapsulation of the traffic received by the set of one or more service provider PoPs.

34.   (Currently Amended) The machine-~~readable~~-storage medium of claim 7, wherein the uniform encapsulation is PPPoE encapsulation.

35.   (Currently Amended) The machine-~~readable~~-storage medium of claim 7, wherein the converting is performed by matching an entry in a data structure that provides a PPPoE session identifier for each PPP PDU to be converted.

36.   (Currently Amended) The machine-~~readable~~-storage medium of claim 35, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

37.   (Currently Amended) The machine-~~readable~~-storage medium of claim 35, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

38.   (Currently Amended) The machine-~~readable~~-storage medium of claim 7 that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations further comprising :

receiving PPP PDUs with the uniform encapsulation at ~~an~~ a set of one or more aggregator side port~~s~~; and

converting the PPP PDUs with the uniform encapsulation back into PPP PDUs encapsulated according to different protocols.

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39   (Currently Amended) The machine-~~readable~~ storage medium of claim 7, wherein the

network element is agnostic of the encapsulation of the PPP PDUs to be converted.

40.   (Previously Presented) A method in a network element, comprising:

        receiving a first data packet that is not in a format of an output media to the

network from a subscriber that accesses the network through the network element;

        converting the first data packet into the format of the output media based on a

session identifier;

        receiving a second data packet encapsulated in the format of the output media;

and

        sending the first data packet and the second data packet in the format of the

output media.

41.   (Previously Presented) The method as in claim 40, wherein the output media is an

Ethernet transmission line.

42.   (Previously Presented) The method as in claim 40, wherein the network element is

agnostic of the encapsulation of the first data packet.

43.   (Previously Presented) The method of claim 40, wherein the format of the output

media is PPPoE encapsulation.

44.   (Previously Presented) The method of claim 40, wherein the converting of the first

data packet is performed by matching an entry in a data structure within the network

element having a relationship between the session identifier and the first data packet.

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45.   (Previously Presented) The method of claim 44, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

46.   (Previously Presented) The method of claim 44, wherein the data structure is modified to indicate that a subscriber side flow that includes the first data packet is active once a PPP session is opened.

47.   (Currently Amended) The method of claim 40, further comprising:

receiving a third data packet with the session identifier in a format of the output media at ~~an~~ a set of one or more aggregator side port<u>s</u>; and

converting the third data packet back into the format of the first data packet based on the session identifier.

48.   (Currently Amended) A method for enabling transmission of <u>Point to Point Protocol</u> (PPP) packets over a single media in a network element, comprising:

receiving a plurality of data packets;

converting the plurality of data packets into <u>Point to Point Protocol over Ethernet</u> (PPPoE) data packets by matching an entry in a data structure that provides a PPPoE session identifier for each one of the plurality of data packets to be converted; and

transmitting the converted plurality of PPPoE data packets over a single media.

49.   (Previously Presented) The method as in claim 48, wherein the single media is an Ethernet transmission line.

50.   (Previously Presented) The method as in claim 48, wherein the receiving a plurality of data packets is agnostic of the encapsulation of the plurality of data packets.

51.   (Previously Presented) The method of claim 48, wherein the data structure is not created until a proxy module within the network element attempts to create an entry in the data structure.

52.   (Previously Presented) The method of claim 48, wherein the data structure is modified to indicate that a subscriber side flow is active once a PPP session is opened.

53.   (Currently Amended) A network element, comprising:

        a ~~demux~~demultiplexer to separate a plurality of packets into Internet Protocol (IP) data packets and PPP over non-Ethernet (PPPoX) data packets;

        a virtual router to receive the IP data packets;

        a Point to Point Protocol (PPP) switch module to receive PPPoX data packets and to convert the PPPoX data packets into Point to Point over Ethernet (PPPoE) data packets based on a session identifier; and

        a port to send the converted data packets.

54.   (Previously Presented) The network element of claim 53, wherein the PPP switch module is to convert the PPPoX data packets by matching an entry in a data structure that provides a PPPoE session identifier for each one of the PPPoX data packets to be converted.

55.   (Previously Presented) The network element of claim 54, wherein the data structure is not created until a proxy module within the PPP switch module attempts to create an entry in the data structure.

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56.   (Previously Presented) The network element of claim 54, wherein the data structure

is modified to indicate that a subscriber side flow is active once a PPP session is opened.

57.   (Currently Amended) The network element of claim 53, wherein the port also

receives PPPoE data packets from ~~an~~ a set of one or more aggregators, and wherein the PPP

switch module also receives PPPoE data packets from the port and reconverts the PPPoE

data packets into PPPoX data packets based on the session identifier for each one of the

PPPoE data packets.

58.   (Currently Amended) The network element as in claim 53, wherein the network

element is agnostic of the encapsulation of the PPPoX data packets separated by the

~~demux~~demultiplexer.

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